Navigation and Ancillary Information Facility

What's New At NAIF?

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Topics

Navigation and Ancillary Information Facility

- **SPICE Toolkit**
- **WebGeocalc**
- **Cosmographia**
- **SPICE 2.0**
- **PDS archiving**
- **Mission Support**
- **Training**

SPICE Toolkit

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- **Current version N0066, Released in April 2017**
- **New in version N0066:**
  - **DSK Type 2 and DSK enabled high level APIs**
  - **new high-level APIs**
  - **new Icy and Mice wrappers**
  - **redo of SPK Type 10 (TLE)**
- **Available from NAIF in Fortran 77, C, IDL, MATLAB, JNI**

  https://naif.jpl.nasa.gov/naif/toolkit.html

  https://naif.jpl.nasa.gov/pub/naif/misc/JNISpice
- **Third party wrappers available in Python, Ruby, and Julia**

  https://github.com/AndrewAnnex/SpiceyPy (Python)
  https://github.com/SETI/pds-tools (Python)
  https://lunaserv.lroc.asu.edu/naif-spice.html (Ruby)
  https://github.com/JuliaAstro/SPICE.jl (Julia)

SPICE Toolkit Plans

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- **Next Version, N0067 (tentatively 2019-2020)**
  - **Additional dynamic frame types (product frames, switch frames)**
  - **Text PCK upgrade**
  - **More C, IDL and MATLAB wrappers**
  - **Header documentation updates (complete examples)**
- **Future Versions**
  - **DSK Type 4 (based on DEM data)**
  - **Additional Geometry Finder APIs**

WebGeocalc

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- **WebGeocalc (WGC) is a web-based GUI and API interface to a SPICE geometry engine running on a remote server**
- **Current Version 2.1, released February 2019**
- **New in versions 2.0 and 2.1:**
  - **RESTful API interface**
  - **Kernel pre-loading**
  - **Ability to use DSKs**
  - **New Range Rate and Phase Angle Finder calculations**
  - **Upgraded Angular separation calculation**
  - **Added Local True Solar Time output**
- **Installations at NAIF and ESA:**

  https://wgc.jpl.nasa.gov:8443/webgeocalc (GUI only)
  https://wgc2.jpl.nasa.gov:8443/webgeocalc (GUI and API)
  http://spice.esac.esa.int/webgeocalc (GUI and API)

WebGeocalc Plans

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- **Next version (tentatively 2019-2020)**
  - **Upgraded “State Vector” calculation for fixed targets and observers**
  - **Possibly completion of VOTable output capability**
  - **New ”Pointing Direction” calculation**
- **Future versions**
  - **GUI and API improvements**
  - **Additional calculations**
  - **Re-implementation of the server to be multi-threaded**

Cosmographia

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- **Cosmographia is a SPICE-enhanced 3D space mission visualization tool**
- **Current Version 4.0, released February 2019**
- **New in version 4.0:**
  - **Upgraded to SPICE N0066, Qt5, PyQt5**
  - **Movable distance, angle, and sensor panels**
  - **Complete dimming of stars**
  - **Additional Annotation catalog configuration parameters**
  - **Additional Python scripting functions**
  - **Loads leapseconds from SPICE**
- **Available from NAIF**

  https://naif.jpl.nasa.gov/naif/cosmographia.html

Cosmographia Plans

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- **Next version (tentatively 2019-2020)**
  - **Python scripting support on Windows (if possible)**
  - **Loading shape data directly from DSKs**
  - **Means to change text size**
  - **Various GUI/interaction improvements**
  - **Additional Python scripting functions**
- **Future versions**
  - **Support split window with multiple views**
  - **Support additional 3D shape formats**
  - **IU improvements**
  - **Python scripting additions**

SPICE 2.0

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- **Continuing to work on the C++ implementation of the SPICE Toolkit**
  - **Object-oriented design**
  - **Support for concurrency**
  - **Some performance improvements**
  - **Support for all existing SPICE kernel types**
  - **Expected to be a multi-year development with the first release to users several years away**
- **NAIF will continue supporting all existing SPICE Toolkits**

PDS Archiving

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- **Preparing and ingesting SPICE archive releases**
  - **PDS3: ODY, MRO, MSL, JUNO**
  - **PDS4: MAVEN, ORX, InSight**
- **Validating and ingesting SPICE archive releases prepared by other organizations**
  - **PDS3: LRO, NEW HORIZONS**
- **Assisting international partners (ESA, JAXA) in preparing SPICE archives**
  - **PDS3: VCO, ROS, MEX**
  - **PDS4: TGO, HAYABUSA-2**
- **No current plans to migrate NAIF's PDS3 archives to PDS4**
  - **SPICE data are the same in PDS3 and PDS4**
  - **The ever-accumulating nature of all SPICE archives make migration complicated**

Mission Support

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- **Continue producing SPICE data and/or providing SPICE support to missions in operations**
  - **US – ODY, MRO, MSL, JUNO, MAVEN, ORX, InSight, SMAP**
  - **International – MEX, TGO, VCO, probably Bepicolombo**
- **Working with/helping missions in development to establish SPICE data production**
  - **Europa Clipper, M2020, Psyche, Lucy, NISAR**
  - **KPLO, probably JUICE**
- **Working to infuse SPICE into the Cubesat community**
  - **A real challenge due to their number, diversity, and relatively low funding**

SPICE Training

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- **Last class – June 2019 near JPL**
  - **30+ students from a wide range of institutions**
  - **More than 50% used Python/SpiceyPy**
- **Next class – June 2020 at ESAC, Madrid**
  - **Watch ESA's and NAIF's "Announcements" webpages for details**

  https://www.cosmos.esa.int/web/spice/training

  https://naif.jpl.nasa.gov/naif/announcements.html
- **Self-training materials available at NAIF**

  https://naif.jpl.nasa.gov/naif/self_training.html

Epilogue

Navigation and Ancillary Information Facility

NAIF is continuing to work hard to advance SPICE capabilities, data, and services to support you, our dear users of the Planetary data community.

We welcome your suggestions